Malignant Hyperthermia: Protocol For Susceptible Patients			
Signing Authority:	Chief Nursing Executive		
Approval Date:	30-04-2018	Effective Date:	07-12-2018

SCOPE:

This policy and procedure applies to nurses, Registered Respiratory Therapists (RRT), Anesthesia Assistants (AA), and physicians who shall be involved in the care of patients with known Malignant Hyperthermia (MH) or who are MH susceptible at the Royal Victoria Regional Health Centre (RVH).

POLICY STATEMENT:

It is the policy of RVH that all patients who are booked for a surgical procedure at RVH shall be assessed preoperatively for possible MH risk factors in order to prevent a MH crisis. Staff caring for patients with known MH or who are identified as MH susceptible shall implement the protocol outlined in this policy.

1. A physician's order is required to administer dantrolene.
2. MH protocol shall be instituted for all known MH patients and MH susceptible patients who are being prepared for the following anaesthetic types: general, local, spinal, epidural, regional Intravenous (IV) block, and IV conscious sedation.
3. A previous uneventful anaesthetic does not rule out MH.
4. Nursing staff caring for MH susceptible patients shall receive annual education pertaining to the management of MH.

It is expected that all staff shall adhere to the principles outlined in this policy.

DEFINITIONS:

Malignant Hyperthermia (MH): is a potentially fatal, rare genetic, autosomal disorder of the skeletal muscle. It is characterized by a hypermetabolic state which can be triggered by the following:

a. A depolarizing neuromuscular blocking agent, i.e. succinylcholine
b. All potent inhalation agents, i.e. isoflurane, desflurane, sevoflurane, halothane or enflurane
c. Psychologic/physiologic stimuli, i.e. extensive skeletal muscle injury, pain, shivering, hypoxia, infection, emotional crisis, hot and humid weather, strenuous and prolonged exercise.

MH Susceptible Patient: may include anyone with:

a. confirmed diagnosis of MH by muscle biopsy
b. previous episode of MH
c. family history of MH
d. family history of anesthetic-related death
e. history of masseter muscle rigidity with previous anaesthesia

f. associated neuromuscular diseases, i.e. Central Core disease, Duchenne muscular dystrophy, rhabdomyolysis
g. idiopathic elevated creatinine kinase (CK)
h. previous episode of dark, cola-coloured urine after anaesthesia

Specialist Coordinator OR Utilization Team (SCOUT): The SCOUT is a physician role that is endorsed by the Hospital Administration and supported by the interprofessional program team. The function of the SCOUT is the daily coordination of the Surgery Program resources. This includes balancing the availability of beds, resources and staffing, directing the order of non-elective cases to maximize the use of program resources in accordance with existing program policies and guidelines, authorization of overtime payments and provision of second OR teams when indicated.

PROCEDURE:

1. There are four MH carts at RVH in the following locations:
    a. Operating Room (OR): Anesthesia Equipment Room (2575a)
    b. Birthing Unit (BU) Operating Rooms: Patient Recovery Area (4173)
    c. Surgery Preparation: Med Room (2303A)
    d. Surgery 3: Med Room (4384)
2. The MH carts located in the OR and in BU Operating Room shall not leave the department. If an MH cart is required in an in-patient unit, the MH carts from either Surgery 3 or Surgery Preparation should be used. Note: Should the MH Cart in Surgery Preparation Medication Room be required after hours, contact the Hospital Service Leader (HSL) or Security to access the locked room.
3. Each MH cart shall contain 18 vials of dantrolene.
4. A minimum supply of 36 vials of dantrolene shall be available at RVH. Pharmacy shall notify the anesthesiologist on call/ OR SCOUT and the OR manager/Resource Nurse/designate any time this condition is not met.
5. All elective surgery shall be placed on hold if 36 vials of dantrolene are not available at RVH.
6. Nursing staff in the locations of the MH cart are responsible for checking and restocking the carts on a monthly basis and after each use (Refer to RVH – 2131 MH Cart Inventory Checklist).
7. MH carts that are not in their assigned area (i.e. are with a patient) should be returned to their areas as soon as possible once they are no longer required.
8. When an MH cart is removed from its assigned area, the Resource Nurse/delegate shall be made aware of the location of the MH cart.
9. Staff returning the MH cart to its home unit shall communicate the status of the cart to the Resource Nurse/designate upon return to area.
10. MH carts shall not be left unattended in public areas.
11. Code Blue crash cart with emergency resuscitation drugs and equipment shall be readily available in the intraoperative and postoperative phases of surgery.

Pre-operative Phase:

1. MH susceptible patients shall be prepared for anaesthesia as per RVH Policy and Procedure.
2. The RRT/AA shall prepare the anaesthetic gas machine for the MH patient following the MH Anaesthetic Gas Machine Preparation Protocol Checklist (RVH-1006) and shall sign and attach it to the anaesthetic gas machine when complete. Checklist includes but is not limited to:
    a. Obtaining of MH circuit components, i.e. Vapor-Clean™ canisters, new circuit, sample line, water trap and breathing bag, new carbon dioxide absorbent canister, new mask.
    b. Removal of all vaporizers from the anaesthetic gas machine and placement on top of machine.
    c. Flushing of vapour from the delivery system by increasing fresh gas flow to greater than 10 L per minute for at least 90 seconds.
    d. Changing of the Vapor-Clean™ filter.
    e. Connecting of new breathing bag, circuit, sample line and water trap while maintaining fresh gas flow greater than10 L per minute for at least 90 seconds.
    f. Running and confirming a passed leak test.
3. The completed checklist shall be part of the patient record.
4. When the surgical procedure has been completed, the RRT/AA shall re-install vaporizers and all circuit components.

Elective Procedures:

1. When an MH susceptible patient is identified in the surgeon's office, this information shall be indicated on the booking form.
2. The Pre-Surgery Treatment Clinic nurse shall notify OR bookings that an "MH Alert" is to be added to "Patient Comment" in OR schedule.
3. The Pre-Surgery Clinic nurse shall document the patient's MH history in their assessment.
4. A maximum of two elective MH susceptible patients can be booked per day and they cannot be booked for the same time. Refer to the Standard Operating Procedure "OR/Endo Booking Procedure – Guidelines for Order of Cases on the OR List" (2016) for further booking guidelines.

Emergent/Urgent Procedures:

1. When an MH susceptible patient is identified, the MH history shall be documented in the patient's assessment record. The admission nurse shall immediately notify:
    a. OR/BU Resource Nurse/PACU Team Leader
    b. Anesthesiologist
    c. RRT/AA

Intra-operative Phase:

1. Every attempt shall be made to ensure that a known MH susceptible patient is booked as the first case of the day.
2. For all MH susceptible patients OR staff members shall ensure that:
    a. The RRT/AA is called to perform the MH protocol for the machine, if not already completed.
    b. The MH cart accompanies the patient to OR theatre.
    c. A second circulating nurse is readily available to assist in the event of an MH crisis.
3. During the surgical procedure, continuous monitoring of blood pressure, temperature, electrocardiogram (ECG), respirations, oxygen saturation, and/or end-tidal carbon dioxide shall be carried out as indicated by the type of operative procedure.

Post-operative Phase:

1. An MH susceptible patient:
    a. Shall require 1:1, or 1:2 nursing care, dependent on patient acuity, in the Post Anaesthetic Care Unit (PACU) by an RN for a minimum of one hour.
    b. Shall be assigned an MH cart and RN or RPN care, up to a minimum of one hour in Surgery Recovery or on an in-patient unit.
    c. May be discharged on the same day of their surgery on the orders of the anaesthesiologist after a minimum of one hour and when they have met the discharge criteria.
2. In PACU, temperature, ECG, respirations, blood pressure, heart rate and oxygen saturation shall be monitored continuously and recorded every 15 minutes for a minimum of one hour, then as per most appropriate standard of care.
3. In Surgery Recovery or on In-patient nursing units, temperature, oxygen saturation, respirations, blood pressure and heart rate shall be monitored and recorded every 15 minutes for a minimum of one hour, then as per routine post-operative monitoring.
4. Notify the anesthesiologist immediately if any of the following signs and symptoms are present:
    a. unexplained tachycardia, tachypnea, difficulty in maintaining oxygen saturation
    b. unexplained muscle rigidity (especially masseter muscle) or muscle pain
    c. increase in temperature greater than 0.5° Celsius every ten minutes
    d. dark brown urine
5. The patient/family shall be provided with MH discharge instructions on the signs and symptoms of an MH reaction (Refer to RVH-4051 “Your Care after Surgery Malignant Hyperthermia Susceptible Patients”).

6. The discharge nurse shall instruct the patient/family on the signs and symptoms of an MH reaction and the importance of reporting immediately to an Emergency Department if these occur.

CROSS REFERENCES:

Royal Victoria Regional Health Centre Clinical Departmental Policy and Procedure (2010): *Admission Criteria to Post Anesthetic Care Unit (PACU) Phase II.*

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